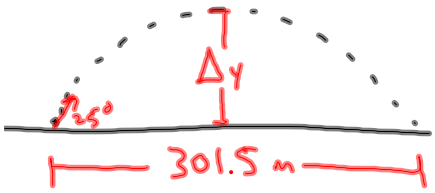
Projectile Motion Practice Problem and HW 1st Block 9.8.11

A golfer hits a golf ball at an angle of 25.0 degrees to the ground. If the golf ball covers a horizontal distance of 301.5 m, what is the ball's maximum height?



$\Delta x = 301.5\ m$

$V_i = ?$

$V_{ix} = V_i \cos(25°)$

$V_{iy} = V_i \sin(25°)$

$\Delta y = ?$

$t = ?$ $V_{fy} = 0$ m/s

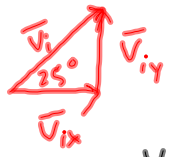
Δx at max height = 150.75 m

$\Delta x = V_{ix} t$

$-\Delta y = V_{iy} t + \frac{1}{2} a_g t^2$

$-V_{fy}^2 = V_{iy}^2 + 2 a_g \Delta y$

$V_{fy} = V_{iy} + a_g t \Rightarrow t = \frac{-V_{iy}}{a_g}$ $\tan(25°) = \frac{V_{iy}}{V_{ix}}$



Four equations:

1) $\Delta x = V_{ix} t$ $\quad t = \frac{\Delta x}{V_{ix}}$

2) $V_{fy}^{\,0} = V_{iy} + a_g t$ $\quad V_{iy} = -a_g t$

3) $\tan(25°) = \frac{V_{iy}}{V_{ix}}$ $\quad V_{ix} = \frac{V_{iy}}{\tan(25°)}$

$V_{iy} = -a_g \left(\frac{\Delta x}{V_{ix}}\right)$

4) $V_{fy}^{\,0} = V_{iy}^2 + 2 a_g \Delta y$

$\Delta y = \frac{-V_{iy}^2}{2 a_g}$

$= \frac{-(-a_g \Delta x \tan(25°))}{2 a_g}$

$= \frac{\Delta x \tan(25°)}{2}$

$= \frac{(150.75\ m)\tan(25°)}{2}$

$= 35.1\ m$

$= \frac{-a_g \Delta x}{\frac{V_{iy}}{\tan(25°)}}$

$= \frac{-a_g \Delta x \tan(25°)}{V_{iy}}$

$V_{iy}^2 = -a_g \Delta x \tan(25°)$

HW: p. 99: 3, 4

p. 101: 1, 3